Date: 05-12-2022

MEng Mechanical Engineering

UCAS code	H301
Institution code	H12
Duration	5 years (full-time) including a one-year work placement. A four year programme is available for applicants with at least two years, full-time relevant work experience.
Start date	September 2023
Accredited by	Institution of Agricultural Engineers (IAgrE)
Location	Harper Adams University campus (and location of work placement)*

The course

Mechanical Engineers apply core principles and advanced simulation tools to take ideas and concepts through to economical, sustainable and fit for purpose solutions. These challenges may be to improve healthcare, create inclusive and sustainable products or even develop the next generation of transportation.

Our Mechanical Engineering students analyse a wide range of problems using fundamental engineering principles to develop systems that are not only theoretically proven but practically applied and tested. You will learn in dedicated engineering facilities which are at the heart of our small rural campus, which offers many opportunities to apply your engineering skills to areas such as food production. agriculture and business. Assessment typically includes industry projects, use of simulation tools, creating and exhibiting new products, investigative portfolios and technical interview.

From day one you will develop your problem-solving skills and produce practical solutions to real and difficult problems as an individual and as part of a team. You will be encouraged to enter external challenges to open your eyes to how others work together and develop your understanding of global issues. Supported by an integrated placement year in industry, you will be primed for your future career using personal, technical and professional skills employers have identified with us as critical to your graduate employability in roles such as production specialist, advanced research engineer, environmental engineer, structural analyst.

Graduates from the BEng (Hons) Programme will be highly capable of reliably managing and delivering solutions to complex engineering problems. MEng graduates, in addition to having developed a greater range and depth of knowledge at the forefront of the industry, will also have demonstrated the ability to identify improvement opportunities and to lead on the creation and dissemination of innovative solutions to complex problems.

New programme for 2023

This is one of a series of Harper Adams undergraduate courses undergoing a curriculum refresh to ensure they provide the best content and experience for students and deliver excellent graduates into industry.

Definitive course information will be shared as soon as it is available. The route is currently subject to validation and subject to accreditation. Use the register interest button to sign up and receive full course

information as soon as it is available.

Harper Adams University 2022 engineering courses are accredited by the Institution of Agricultural Engineers, on behalf of the Engineering Council. The new programmes for 2023 will be subject to re-accreditation (see below).

Duration

5 years (full-time) including a one-year work placement. A four year programme is available for applicants with at least two years, full-time relevant work experience. Please contact Admissions for further information on this option.

A-level entry requirements

- A2 level grades **AAB** including A2 Mathematics
- Offers tend to be in the region of **136** UCAS points
- Mathematics is mandatory, the following subjects are also preferred; Physics, Biology, Chemistry, Further Mathematics, Design Technology
- General Studies and Critical Thinking are encouraged but **not** included in grades required
- Applicants can expect to receive offers including specific grades in specific subjects (for example, a B or C at A level, or an M or D for BTEC modules)
- Key Skills (and other level 2 variants) and First Certificates/Diplomas are not accepted in place of GCSE passes
- Overseas applicants please check our English Language Requirements
- **4 GCSEs at grade C/4 or above**, including English Language, Maths and a Science
- We have developed a range of measures and initiatives to give everyone the best chance to access our undergraduate degree programmes. The main feature of **Access to Harper** is our contextualised offer scheme. A contextualised offer is an offer which is reduced, by one grade or more from the standard entry requirement and is made to those applicants who may have experienced personal circumstances which put them at a disadvantage during their education, such as attending a low achieving school, living in an area of low participation in Higher Education or being a Care Leaver. The aim of this is to make the University more accessible for those applicants who may not have previously thought that they were eligible to apply. We have also introduced reduced entry requirements for those applicants who are over 21 years of age and further initiatives to make the application process easier for those applicants who need it.

  To check if you qualify please visit the Access to Harper page.

Note: Entry Requirements are for guidance only, please check the UCAS website or contact Admissions for further information.

Work placement

Our students spend their year-long placement working as professional engineers with an industrial firm such as BAE Systems, JCB, Niftylift or Cummins Engines. You will be helped to find the right role by an engineering placement manager based at Harper Adams.

Accreditation

This course is accredited by the Institution of Agricultural Engineers (IAgrE), and MEng graduates are eligible for initial registration for Chartered Engineering status. The Institution of Mechanical Engineers (IMechE) describes an Incorporated Engineer as an applications-based engineer who works with the technology that

is available, while a Chartered Engineer specialises in analysis, creating the technology of tomorrow.

What will I study?

Year 1		Year 2		Year 4		Year 5	
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Materials	20	Design and Validation	20	Computer Programming for Engineers	10	Emerging Technologies	20
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Electronics and Microcontroller Programming	10	Materials Engineering	20	Advanced Engineering Analysis	20	Engineering Knowledge Exchange	20
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Measurement	20	Mechanical Science 2	20	Engineering Management & Leadership	20		
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The Professional Engineer

Year of study 1
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Engineering relies on three core elements, namely scientific principles, mathematics, and realisation. Scientific principles underpin all engineering, while mathematics is the language used to communicate parameters and to model and optimise solutions. Realisation encapsulates the whole range of creative abilities which distinguish the engineer from the scientist: to conceive, make and actually bring to fruition something which has never existed before - and to create intellectual property, associating invention with commercial or social value. It is, therefore,incumbent on Professional Engineers to develop solutions responsibly – and the ability to develop economically viable and ethically sound sustainable solutions is an essential and distinguishing characteristic of engineering.
In this module, you will:

- Explore the required qualities and requirements of becoming a professional engineer, as well as the range of roles and industries available within the Agricultural, Automotive and Mechanical Engineering sectors. You will use this to inform your early career planning andselection of specialist routefrom Year 2.
- Develop your study skills, giving you the tools to help your transition into Higher Education and to build your confidence in information literacy, research and independent learning.
- Learn and apply a range of communication methods – including presentations, 3D Solid Modelling, Technical Drawing.
- Be guided through the production of an exemplar case study portfolio, where you follow a defined process to develop an engineered solution to a constrained mechanical problem – and thus gaining experience as to how the various elements that you study on your degree combine to give you the capability to reliably engineer solutions to given problems.

Materials

Year of study 1
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Materials, processing and design are three fundamental engineering disciplines which must be considered together at the start of the design process; it is not possible to design without understanding materials and the way in which they can be shaped and their properties modified.
This module intends to give you a fundamental knowledge of materials, properties and processing techniques and, overall, aims to equip you with the knowledge and confidence to successfully select the most appropriate material for an application as well as understanding how it may be made. Up-to-date materials selection tools and software will be used.
It is important to recognise that materials are a finite resource. Therefore, sustainability and supply will also be major themes.
This module will follow a design led approach and will be structured around case studies and applications. Practical activities will be included to demonstrate properties and processes.
This module also serves to support you with the selection and use of information and literature, so one of the assessment points will be a literature review.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

- Differentiate between the key design limiting properties of typical engineering materials.
- Explain fundamental material processing and joining techniques and where their use may be appropriate.
- Propose, select and justify appropriate materials and processes for given applications.
- Evaluate information about materials supply challenges.

Problem Solving C23

Year of study 1
Credits 10
Core/option Core

* Subject to validation *

Overview of Module:
This module will introduce you to **how** to approach tackling unfamiliar problems and**why** engineers follow a systematic approach in order to reliably and repeatedly tackle complex problems. It will ensure that you can practice a range of problem-solving methodologies, tools and techniques.
Through a series of practical problem solving activities, you will develop discipline in undertaking a structured approach. This will be a hand on applied process to train you into thinking and behaving as a professional engineer.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Define a given problem with consideration for constraints, needs and options.
Use industry standard methodologies to identify root cause for given problems.
Use a structured approach to solution selection and implementation.

Electronics and Microcontroller Programming

Year of study 1
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
Electronic systems are key to modern engineering. You will learn the basics of electrical and electronic systems and programming of microcontrollers applied to real world engineering systems.Using appropriate theory and practice, you will design circuits, specify and select components and build circuits. Additionally, you will interface microcontrollers to components, and program them to complete a specific task.
You will learn through a mixture of lectures and tutorials, and practical classes where you will apply the theory and develop practical skills.
You will be assessed throughout the module by mini tests which will as inform you of your learning progress, but also by an end of module time constrained computer-based assessment. Additionally, to test your practical skills, you will design and manufacture a functioning circuit.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
- Design circuits and select suitable components to meet a requirement.
- Interface a microcontroller to components to meet a requirement.
- Write a program for a microcontroller to meet a specific task.
- Build a physical circuit and test it against a specification

Actuation

Year of study 1
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
This module is providing you with a thorough grounding in the development of mechanisms and technologies for actuation, for example, chain drives, hydraulics, levers, gears. This is the module that will take you from entrant with no or minimal experience of actuation technology to become experienced and be able to work confidently with actuation technology.
Through a range of teaching and learning techniques, such as lectures, tutorials, practicals, reading, the module will investigate the development of actuation science, methodologies and technologies relevant to agricultural, automotive and mechanical engineering disciplines. The module will be assessed using a blend of mini online tests and coursework, based on the application of actuation technologies relevant to your chosen engineering discipline.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
- Design mechanisms to translate force, torque and velocity to meet given requirements.
- Select the components required to satisfy the functional performance needs for a given actuation system.
- Explain the operation of fundamental fluid power components and simple systems.

Measurement

Year of study 1
Credits 20
Core/option Core

*subject to validation *

Overview of Module:
This module will show you that measurement is not a simple 'one off' activity but is professional engineering process. The module will develop your ability to use measurement equipment and to record and analyse measurement results. It will develop your ability to complete the whole process of designing, validating and conducting real engineering measurements.

Intended Learning Outcomes:(Typically between 3 and 5)[xii]
Students who successfully complete this module will be able to:

Report measurements using appropriate systems of units and explain their traceability.
Experimentally determine, analyse and report upon uncertainty of measurement.
Select and correctly deploy different types of measurement technology.
Design, conduct and validate an engineering measurement to achieve a specification.

Mechanical Science 1

Year of study 1
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
In this module you will be introduced to the connection between mathematical tools and techniques, accepted theories of mechanics and the use of software applications in the modelling, analysis and prediction of the behaviour of mechanical systems. These could be mechanisms, components of machines, or moving bodies, on any scale . It a uses a combination of approaches including practical, theoretical and software. A regular series of mini-tests will check your understanding and progress, with a larger applied problem-based assessment at the end. This module is essential to your understanding in a wide range of other subjects at this level and further on in your course.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

Recognise the value of theoretical methods to predict real world behaviour of mechanical systems.
Select and apply a range of mathematical techniques to solve static and dynamic problems.
Use physical and software resources to investigate, analyse and communicate solutions to engineering scenarios.

Agri-Tech

Year of study 2
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
Mechanised agricultural is seeing a shift towardutilising Agri-Tech for data acquisition, management, insight and implementationto ensure food production within planetary boundaries. You will beintroduced to key sensing and data tools commercially available to farms and explore how this is practically implemented through mechanisation and automation. You will engage with a range of subject experts from both academic and industry in a series of lectures, discussionsand practical demonstrations. You will propose an economically and agronomically viable Agri-Tech solution for a farm case study as the module assessment.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

Critically appraise the latest commercial precision farming technologies and their limitations.
Review the findings of published research, in terms of potential implications for agriculture.
Financially model farming technology for a specific application to assess its viability.

DMAIC

Year of study 2
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Define, Measure, Analyse, Improve and Control, or DMAIC as it is widely known, is a data-driven improvement process used in all kinds of businesses, in projects and in design.
This module will provide you with the tools and methods to tackle problems and projects in a structured way through the aforementioned phases.
This module will incorporate aspects of measurement, experimentation, analysis, processes, productivity, quality, lean and waste.
Learning will be through a mixture of lectures and structured practical activities, and you will be assessed by a review, an experiment and a manufacturing scenario.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

- Discuss the requirement for, and the impact of, a defined and data-led process for continuous improvement and problem solving.
- Collect, process and assess the quality of data.
- Select and apply appropriate analysis tools to a data set.
- Propose and evaluate improvement and control plans.

Autonomous Systems

Year of study 2
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
Automated systems are found in all areas of the modern world.
You will learn the basics of automation including programming, electronics, mechanical systems and commercial applications.
Using appropriate theory and practice, you will design an automated system, specify and select components and demonstrate its functionality.
You will learn through a mixture of lectures, tutorials, and practical classes where you will apply the theory and develop practical skills.
You will be assessed by a group presentation, where you will investigate a commercial system, and to test your practical skills, you will design, manufacture, and demonstrate a functioning automated system.

Intended Learning Outcomes:(Typically between 3 and 5)
Students who successfully complete this module will be able to:

- Appraise commercial automated systems
- Understand the components and control of automated systems
- Demonstrate the ability to implement an automated system

Design and Validation

Year of study 2
Credits 20
Core/option Core

* subject to validation *

Overview of Module:[xi]
The design and validation involved in the engineering of a product is key to it's success.
As well as the ability to rigorously apply engineering theory to an application, a professional engineer also needs a good understanding of the wider world in which their product will operate, and of the customer who will purchase it.
In this module you develop your professionalism and wider communication and teamworking skills, by following a structured design process to deliver a product that meets a customer brief.
You will design and validate a product from beginning to end, improving your capability in defining a problem, utilising specialist methodologies and techniques, working in a team, and liaising with customers and technical specialists.
This module will also provide the opportunity for self-reflection and professional development in preparation for your placement year, where applicable.

Intended Learning Outcomes:(Typically between 3 and 5)[xii]
Students who successfully complete this module will be able to:

- Identify requirements and constraints within a client brief, in order to create a product design specification
- Engineera product to meet a product design specification
- Develop a product to meet 'design for manufacture' and 'design for assembly' constraints.
- Plan and execute a test, to evaluate a design against a product design specification
- Reflect on feedback to guide the creation of a personal development plan for continuing professional development

Integrated Electronic Systems

Year of study 2
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
In many engineering solutions, there is a combination of electronic control systems and mechanical systems forming an integrated system.You will learn about electronic control, and the selection of sensors and actuators to form an integrated system whilst developing algorithms and associated programs to achieve a required function.
You will learn about integrating microcontroller systems through lectures covering the theory and tutorials to put the applications into perspective. Additionally, you will complete practical exercises on algorithm and program development.
You will be assessed by a series of mini tests throughout the module, and an end of module piece of coursework.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Select system components and integrate them into a control system.
Develop and implement an algorithm for a control system to achieve a given task.

Materials Engineering

Year of study 2
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
In this module you will develop and apply a range of selection strategies to enable you to select materials, their shaping and treatments. By also considering advances and trends in materials, you will be able to propose future-facing and sustainable solutions to meet design needs. You will also have the opportunity to create components, using a combination of CAD/CAM and subtractive (CNC) and additive manufacturing methods and ensure their tolerances and finish via CMM and surface profilometry.

All of this will be done in the context of
Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Select suitable materials and manufacturing processes to achieve a cost effective, sustainable solution which satisfies given requirements.
Make informed and data-driven judgements on the sustainability of selected materials and processes, recognising the possible effects of process on properties.
Identify opportunities for material use and replacement from a range of emerging and advanced materials and technologies.
Take a customer specification, via a digital solid model, to a subtractive or additively manufactured product.
Measure a given product/component in order to be able to compare to design specification and advise on process improvement.

Energy Production, Transfer and Storage

Year of study 2
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
All activities in nature involve some interaction between energy and matter. Many engineering systems produce, convert, use and importantly waste energy in various forms. In this module you will develop your knowledge of abroad range of topics and how to analyse and predict outcomes using theoretical calculations, experimental techniques and computer simulation.You will learn how to define an energy system, how physical properties of ideal and real substances can be used efficiently and about important energy systems such as refrigeration, solar and hydro power. An integrated approach is used using extensive use of practical engineering examples.You will present a solution to a widely understood problem during the module and write a technical report on an applied case study at the end of the module. This module is essential to your understanding of the importance of energy in engineering and further study of engineering impact on the environmentlater on in your course.?

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

- Apply the basic principles of energy analysisand heat transfer to standardthermodynamic systems.
- Evaluate a range of energy systems using quantitative data, appropriate theory and experimental techniques.
- Communicate a viable solution to a widely recognised problem involving energy.
- Solve an energy system problemthrough the selection and application of appropriate theoretical analysis and simulation methods and present a justified solution.

Mechanical Science 2

Year of study 2
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
In this module you will develop your knowledge of mechanical systems which will give you the ability perform more realistic modelling to bring the theoretical calculations much closer to those expected in practice.You will learn to analyse critical applications e.g. buckling theory; pressure vessels; fatigue failure, and determine dynamic behavioure.g; second order response; imbalanced dynamic forces; transmission of vibrations. A regular series of mini-tests will check your understanding and progress, with a larger applied problem-based assessment at the end. This module is essential to your understanding in a wide range of other subjects at this level and further on in your course. ?

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

Apply knowledge of static and dynamic systems to evaluate a range of multi-factor mechanical engineering problems.
Interpret quantitative data to determine the characteristics and response of mechanical systems.
Solve a complexmechanical scenario through the selection and application of appropriate theoretical analysis andsimulation methods and present a justified solution.

Ethics and sustainability

Year of study 4
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
In order to be a complete professional engineer you will need to have a mature consideration of ethics and sustainability. The engineering council requires professional engineers to maintain and promote a high ethical standard and challenge unethical behaviour.
You will be shown how to construct and evaluate ethical arguments and you will be shown a wide variety of ethical issues in modern society. This will also develop your ability in ethical reasoning which is the ability to identify, assess, and develop ethical arguments from a variety of ethical positions. This will be developed during taught sessions where you will be encouraged to review and critically evaluate case studies and emerging ethical issues.
You will be encouraged to consider sustainability in its broadest sense – as applied to environment, business, design and society. This is of paramount importance as engineers must provide solutions that use energy and resources sustainably.

Intended Learning Outcomes:(Typically between 3 and 5)[xii]
Students who successfully complete this module will be able to:

Construct and evaluate ethical arguments in order to consider wider impact of decisions on society.
Evaluate the environmental impact of decisions and business sustainability.
Apply the legal principles of intellectual property and the neighbour principle to product design and development.
Evaluate the ethical impact on business and sustainability of quality management systems and continuous improvement including product and material lifecycle and the circular economy.
Evaluate the impact of security considerations from the international security to corporate data theft.

Computer Programming for Engineers

Year of study 4
Credits 10
Core/option Core

* subject to validation *

Overview of Module:
This module will provide you with knowledge and skills in programming, from basics to advanced tasks, and an overview of software, hardware, computing environments and conventions. By considering the timeline of developments in computer science you will appreciatehow relatively recent this subject area is and the fast pace of change. Data types and structures are a key foundation, along with procedural code (for example loops and conditional statements) which you will use to developapplications in data science, interfacing with devices and user interface programmes. The module assessments will be supported by class activities, with one coursework assessment partway through, and a final coding assessment.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

Edit and write reproducible programmes to carry out specified tasks, implementing good practice.
Demonstrate a knowledge of appropriate software, hardware, computer environments and processes.
Select,create and evaluate appropriate data types and structures, and processes (e.g.to process experimental data, secondary data or user input).

Group Project C23

Year of study 4
Credits 20
Core/option Core

* Subject to validation *

Overview of Module:
Engineers are expected to be able to work effectively both independently and as a member of a team in the delivery of solutions to agreed standards and deadlines. Engineers, to be effective, must be able to study a given situation and be able to calculate delivery feasibility against time and resource availability. It is a lso a normal expectation that engineers are required to resolve complex problems in parallel to other work, and to work effectively with colleagues.
You will have gained group work experience in prior study and during the industrial placement period (or equivalent). This module aims to provide you with the opportunity to demonstrate your capability of working as a member of a project team having joint and several responsibility for the delivery of the project, and to demonstrate, in an applied context: an appropriate depth and breadth of technical knowledge and management capability; professional engineering behaviours; and an understanding of project delivery risks.
Each group project is generally sourced from companies within the engineering industry - companies typically provide background information, details of the problem, and some references for the team at the outset. Project deliverables and success criteria will be negotiated between client and team early in the project.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Devise, negotiate and agree deliverables in response to a given project.
Plan and manage the delivery of a programme of workto deliver stakeholder value.
Conclude the delivery of project deliverables in relation to stakeholder satisfaction
Appraise personal and team performance

Advanced Engineering Analysis

Year of study 4
Credits 20
Core/option Core

* subject to validation *

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

- Designcomplex engineeringpartsthrough the selection and application of appropriate computational methods.
- Demonstrate the limitations in applying theoretical structuraland dynamic analysis toamechanical system.
- Employ robust verification and validation methods to present a solution with a high degree of confidence for a research or commercial system.

Global Engineering Challenge

Year of study 4
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Mechanical Engineers are required to help in a wide range of challenges on a community or global scalesuch as: improving product life cycle, enhancing the quality of life, meeting UN global sustainability goals. In this module you real-world Engineering Challenges will be presented that reflect the difficulties faced by a specific geographic or demographic community, as well as considering environmental impact.You will work in small teams to develop design solutions that requireboth technical and cultural dimensions. Youwill develop the skills to approach problems holistically and tocritically assess social impact before synthesising appropriate engineering solutions.
Subject experts will cover key topics, theories and techniques which will be strengthened through tutorials, site visits and field trips. Engagement with external stakeholders e.g. NGOs and companies, will provide alternative views.
You will be assessed by a case study of a current engineering issue where you will need to gain a range of stakeholders' views as well as proven engineering practice to propose an integrated engineering solution.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

Apply theoretical knowledgeand methods to assess the impact of range of mechanical engineered systems.
Synthesise and critically appraise professionally relevant informationand assumptions of a selected global challenge.
Apply critical thinking and problem-solving skills to analyse complex information and propose a design solution that is based on accepted sustainability goals.

Engineering Management & Leadership

Year of study 4
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Engineers have a leading role in society and industry. Development of key management skills is an

essential precursor to successful leadership of projects, operations and service delivery in the roles to which engineers are recruited. Critical to improvement of operational and service delivery outcomes is the ability to define, plan and lead change in complex organisations. This module will establish your mastery in the fundamentals of managing and leadingbusiness improvementthrough;

- Evaluation of those characteristics of individuals and businesses that drive performance
- Development of compelling improvement rationales and powerful communication approaches
- Synthesis of comprehensive change management strategies and development of influential leadership approaches.

In order to develop your leadership, at both a strategic and individual level, you will explore theories of motivation, methodologies for deployment of objectives and tactics for identification and management of barriers to progress. Furthermore, through the understanding of change management theory and organisational behaviour, you will be prepared to plan for and to deliver successful business improvements in whatever environment you go on to pursue a graduate career.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:

1. Evaluate the key characteristics of individuals and organisations pertaining to business performance.
2. Conduct a critical analysis of business output metrics in order to evaluate improvement opportunities.
3. Formulate and communicate a persuasive and impactful proposal for a business performance improvement.
4. Develop an effective change management strategy and deployment mechanism for the delivery of a business improvement.

Professional Engineering Research

Year of study 4
Credits 20
Core/option Core

* Subject to validation *

Overview of Module:[xi]
This module will allow you to develop your skills and knowledge in finding and defining a research question. It will also guide you through the process of selecting appropriate analyses methods and experimental design. You will be shown how to select the appropriate software for analysis and presentation of results according to the needs of your audience. The module will require you to independently tackle a small research question of your own choice but in a supervised and guided manner. This will involve conducting a supervised individual practical experiment to collect real world data. After this module you will have the skills and experience to tackle your Masters Engineering Project in your final year.

Intended Learning Outcomes:(Typically between 3 and 5)[xii]
Students who successfully complete this module will be able to:

Define the topic and scope for a research study using literature.
Select, evaluate, plan and conduct an experimental study with consideration of resources, software, statistical power and risk.
Analyse experimental data, interpret and present the resultsand write conclusions appropriately for a given audience.
Evaluate the reliability and validity of research

Masters Engineering Project

Year of study 5
Credits 60
Core/option Core

* subject to validation *

Overview of Module:
The ability to resolve complex problems is a fundamental capability of a professional engineer. Fundamental elements of this capability include: the intrinsic motivation and capability to identify, define and justify improvement opportunities ; being able to define a problem; being able to select and correctly apply relevant tools, techniques, methods and practices in the resolution of the problem; and the ability to critically evaluate the effectivity of the applied process.
Successful completion of the Masters Engineering Project will demonstrate your motivation, resilience, and ability to work at the forefront of your chosen field of specialisation and contribute to the generation of new knowledge. Your Masters Engineering Project functionally assesses in a holistic way your ability to engage with and deliver a successful body of work and as such forms the capstone activity for the curriculum.

Intended Learning Outcomes:(Typically between 3 and 5)
Students who successfully complete this module will be able to:

1. Select, justify and use appropriate tools and techniques to identify, define and constrain an improvement opportunity within their discipline.
2. Plan and utilise appropriate methods to ethically and sustainably deliver a solution to the identified improvement opportunity.
3. Conduct a technical evaluation of the project outcomes in relation to the satisfaction of the project requirements.
4. Conduct a reflective evaluation of the project outcomes in relation to the methods and practices adopted.
5. Present and defend project impact, conclusions and recommendations to a technical and non-technical audience

Emerging Technologies

Year of study 5
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
Given the dynamic nature of engineering and the engineering environment, it is important to ensure that engineers leadersare aware of new and developing technologies, subjects and industrial advances and appreciate the sociological, ethical, legal, economic, political, environmental, and managerial impact these will have in the future. This module is designed to ensure you have the skills to maintain contemporary knowledge throughout your careers and are aware of current key developments within engineering, industry and technology. Critically you will synthesise sources and opinions to evaluate wider social, economic, environmental, and ethical relevanceof these developments. You will develop awareness and understanding of a broad range of issues, initiatives and concepts particularly in areas of recent/ongoing research activity, through a mixture of keynote lectures, discussive tutorials and independent research.
Your assessment will be through technology sustainability review, firstly formatted as a journal style paper and then secondly presented as an engaging keynote talk as part of a module mini conference.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Evaluate the consequences of recent advances in engineering upon the relevant industry.
Assess the potential impact of recent advances in engineering upon the wider environment.

Review the findings of published research in terms of their validity, reliability and implications for the future.
Synthesise evidence from a range of research and theoretical concepts to undertake a critical analysis of their impact upon the engineering industry.

Managing New Product Development

Year of study 5
Credits 20
Core/option Core

* subject to validation *

Engineering Knowledge Exchange

Year of study 5
Credits 20
Core/option Core

* subject to validation *

Overview of Module:
As a professionalengineeryou should help widen the public understanding of your engineering discipline and its key role in supporting many of the most important economic and technical problems. Engineering is commonly misunderstood and used incorrectly or in the wrong context. This module will require you to disseminate an aspect of your workin a diverse and inclusive mannerto help counter these perceptions by educating the wider public. You will work with knowledge exchange professionals including PR experts, academics, journalists, social media content creators and influencers.You will be assessed by reflecting upon the development, implementation, and impact of a knowledge exchange/dissemination strategy. You will be required to review your personal career plan, career readiness and progress towards appropriate professional registration.

Intended Learning Outcomes:
Students who successfully complete this module will be able to:
Create and implement a knowledge exchange strategy.
Communicate to a diverse technical and non-technical audience in an inclusive manner.
Critically reflect on personal and professional career plan.